



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

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CRUISE RESULTS

UNOLS R/V *Hugh R. Sharp*
Cruise No. S1 12-01 (Parts I – III)
Sea Scallop Survey

CRUISE PERIOD AND AREA

The cruise period was 1 June - 7 July 2012 and was conducted in three parts: Part I was from 1 - 12 June, Part II was from 15 - 25 June, and Part III was from 27 June - 7 July. The area surveyed was from the Mid-Atlantic Bight to Georges Bank, and sampling depths ranged from approximately 31 to 113 meters (17 to 62 fathoms). Approximate station locations are shown in Figures 1 and 2.

OBJECTIVES

The objectives of the survey were to: 1) determine the distribution and relative abundance of sea scallops, *Placopecten magellanicus*, and associated fauna utilizing two sampling devices: the 8-foot, standardized sea scallop dredge and the stereo-optic towed camera array (HabCam); 2) collect biological samples; 3) determine the most economical and valid methodology for consecutive sampling of the dredge and HabCam.

METHODS

Operations and gear for cruise S1 12-01 Parts I – III conformed with the Cruise Instructions for the Sea Scallop Survey, dated 25 April 2012; Addendum I, dated 21 May 2012; Addendum II, dated 21 May 2012; and Addendum III, dated 28 June 2012.

Pre-selected, random stations were sampled using a modified 2.44 m (8-foot) wide, New Bedford-type scallop dredge rigged with 5.1 cm (2 inch) diameter rings and lined with at 3.8 cm (1½ inch) polyethylene stretched mesh liner. Tow duration was 15 minutes, tow speed was 3.8 knots, and the dredge was fished using a 3.5:1 wire out to depth scope. Tow distance was recorded using differential GPS, and a recording inclinometer was mounted on the dredge to collect bottom-contact time data.

All catch and biological data were recorded using the shipboard, automated, data-entry system, Fisheries Scientific Computing System (FSCS). This system uses digital scales, electronic measuring boards, and touch-screen monitors to record data on deck.

After each dredge tow of the scallop survey, the entire catch was sorted into biological and habitat components. Live whole and clapper shells of various scallop species, including sea and Icelandic, were weighed using the motion-compensated, digital scales. Representative length frequencies for all scallop species were collected to the nearest millimeter using electronic measuring boards (Icthystick); selected fish species incidentally caught in the dredge were also measured to the nearest millimeter. Weights and total numbers were recorded for all other fish species at each station. Furthermore, the weights and total numbers of cancer crabs and starfish were recorded at selected stations. Habitat portions were estimated by basket volume, converted into number of liters (where one basket = 46 liters), recorded into the FSCS system, and then finally discarded.

Surface temperatures were measured using the R/V *Hugh R. Sharp*'s hull-mounted temperature sensor and logged by the Scientific Computer System (SCS) at all stations. Temperature and conductivity profiles were made at approximately every fourth dredge station using a conductivity, temperature, and depth instrument (CTD). A bottom salinity sample was obtained twice a day, when applicable, to calibrate the CTD.

Additionally, cooperative work was conducted throughout all legs of the sea scallop survey to determine the most economical and valid methodology for consecutive sampling of the dredge and the Habitat Camera system (HabCam) as a surveying tool, or part of the suite of survey tools, for future NOAA scallop surveys. Developed by a group of researchers associated with Woods Hole Oceanographic Institute (WHOI), as well as in conjunction with particular members of the commercial fishing industry, HabCam is a towed, seafloor-imaging camera system with the following capabilities: 1) acquisition of stereo-optical and acoustic imagery, which can be viewed in "real time"; 2) the ability to count and measure scallops and groundfish; 3) measurement of biodiversity and community structure; 4) characterization of substrate; and 5) measurement of oceanic properties (salinity, temperature, nutrients).

The system is designed to operate over the range of the continental shelf and, while at sea, is able to image a track of over 100 nautical miles each 24 hour day. The current Northeast Fisheries Science Center's 8-foot wide scallop dredge can make approximately 24, 15-minute tows at 3.8 knots per day, covering about 4,500 square meters (m^2) per tow and 106,704 m^2 per day. Continuous operation with HabCam towing at about six knots covers over 260,000 m^2 per day. Thus, the spatial coverage of HabCam is over 2.5 times the area covered by the survey dredge.

The HabCam system was mounted in a ten-foot long by three-foot wide steel frame and towed one to three meters off the ocean floor at a speed of approximately six knots. An operator controlled the system by means of the R/V *Hugh R. Sharp*'s winch-driven, fiber optic cable, which allowed for real-time data collection and provided power to the unit.

RESULTS

The survey sampled at 210 stations, with 57, 72, and 81 dredge hauls made on Parts I, II, and III, respectively. The dredge flipped three times; stations were re-towed in all flip cases. Bottom temperatures were collected at 51 stations using the CTD system, while bottom water samples for CTD calibration were taken at 40 stations.

A total of 1,489 samples were collected to support five internal and external investigations (Table 1).

During Parts I-III of the scallop survey, the HabCam vehicle obtained about 7.4 million image pairs over the course of a 3,898 nm cruise track, resulting in approximately $1.86 \times 10^6 \text{ m}^2$ covered from Cape Hatteras to Georges Bank.

DISPOSITION OF DATA

Catch data and hydrographic data will be analyzed at the NEFSC Laboratory in Woods Hole, Massachusetts. The various collections were forwarded to researchers listed in Table 1. Resulting data will be audited, edited, and archived in an Oracle database.

HabCam images will be further analyzed for biological data both at the Woods Hole Oceanographic Institution and at NOAA's NMFS Woods Hole Lab.

SCIENTIFIC PERSONNEL

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Table 1. Special samples obtained for various investigators on UNOLS R/V *Hugh R. Sharp* Sea Scallop Survey, during 1 June – 7 July 2012.

Investigator and Affiliation	Samples Saved	Approximate Number
DiBacco, Claudio BIO DFO, Dartmouth, NS, Canada	sea scallop muscle	115 preserved
Galbraith, John NMFS, NEFSC, Woods Hole, MA	unidentified fish	19 individuals
Guest	sea scallop seed	60 individuals
Hart, Dvora NMFS, NEFSC, Woods Hole, MA	sea scallop shells	469 shells
	scallop meat weights	464 weights
	sea scallop, diseased	1 individual
	<i>Asterias</i> sea stars	346 examined
McBride, Richard NMFS, NEFSC, Woods Hole, MA	yellowtail flounder (females)	15 preserved

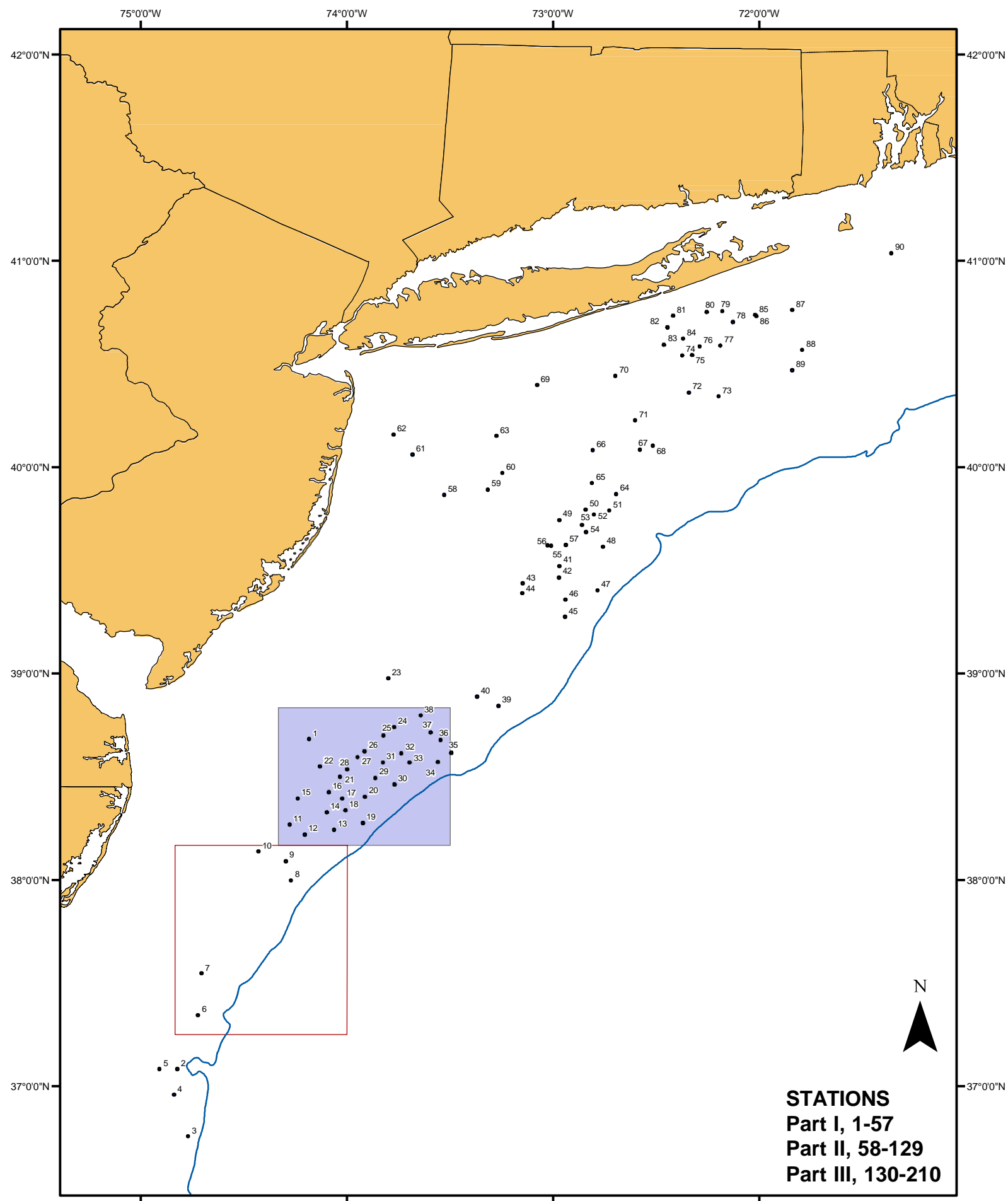


Figure 1. Dredge tows made from UNOLS R/V *Hugh R. Sharp* (12-01) , during NOAA Fisheries Service, Northeast Fisheries Science Center Sea Scallop Survey, June 1 - July 7, 2012

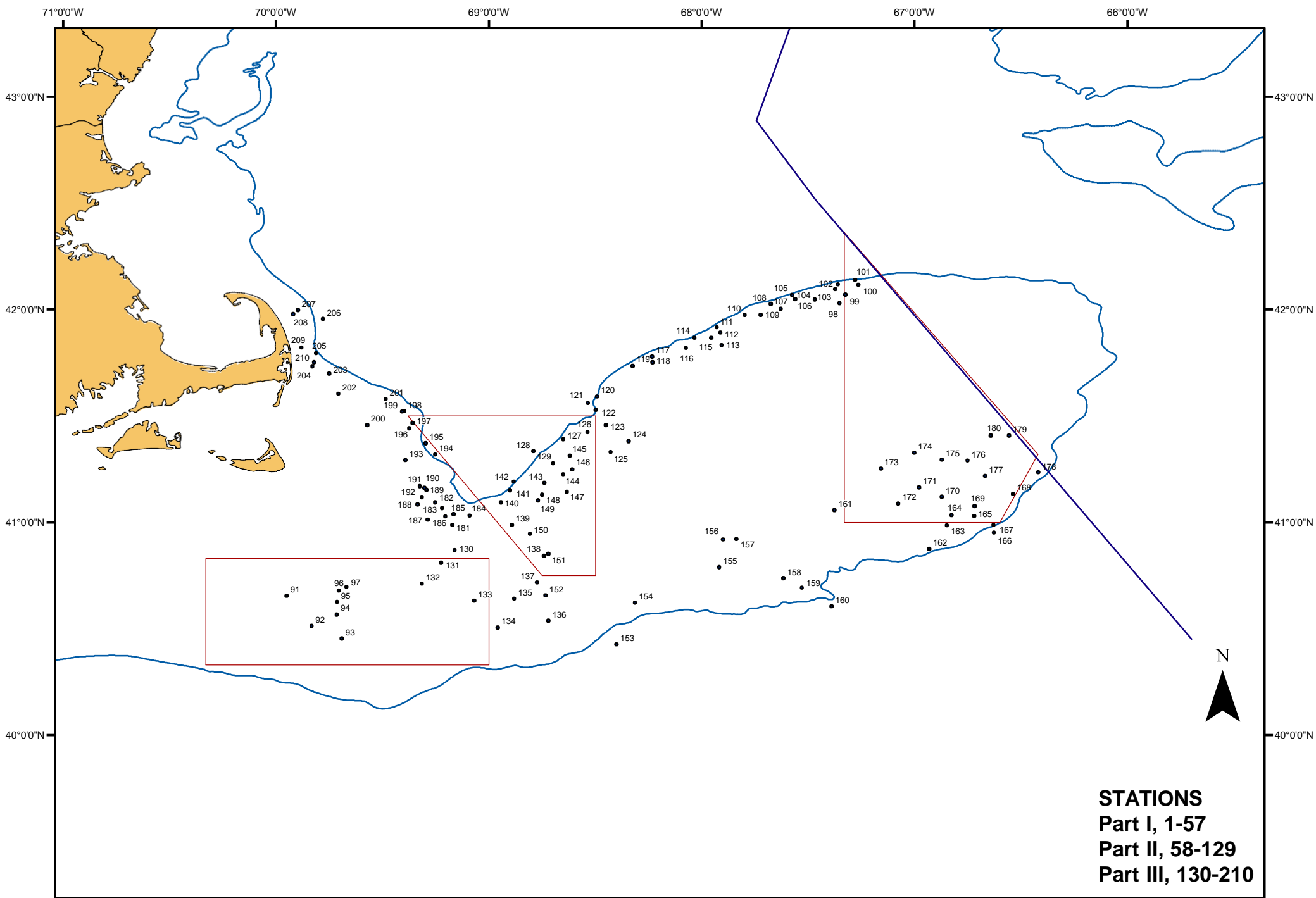


Figure 2. Dredge tows made from UNOLS R/V *Hugh R. Sharp* (12-01) , during NOAA Fisheries Service, Northeast Fisheries Science Center Sea Scallop Survey, June 1 - July 7, 2012